v.12 #9

The MONTHLY REVIEW

Published Monthly by the

American Electroplaters Society

A SOCIETY FOR THE ADVANCEMENT

OF THE

SCIENCE OF ELECTROPLATING

SEPTEMBER, 1925

KRESGE-HOOKER
WAYNE UNIVERSITY
SCIENTIFIC LIBRARY

Entered as second-class matter, September 26, 1922, at the Post Office at Oneida, N. Y., under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103, Act of October 3, 1917, authorized September 26, 1922.

EXECUTIVE BOARD, A. E. S., 1925-1926

President
E. J. Musick, 7144 Kingsbury Blvd., St. Louis, Mo.

First Vice-President
George Gehling, 5001 Edmund St., Philadelphia, Pa.
Second Vice-President
John H. Feeley, 411 Aylmer St., Montreal, Quebec
Secretary-Treasurer
R. Steuernagel, 1508 Concordia Ave., Milwaukee, Wis.
Past President
Frank J. Hanlon, 216 N. Jefferson St., Chicago, Ill.

Editor
F. C. Mesle, 166 Willow Place, Sherrill, N. Y.
Associate Editors
Dr. Wm. Blum, Bureau of Standards, Washington, D. C.
R. L. Shepard, 1388 Yorkshire Road, Fox Creek Sta., Detroit, Mich.

APPOINTMENTS BY PRESIDENT MUSICK

I have appointed the following members and have received their acceptances:

A. E. S. Research Committee

Past President, F. J. Hanlon, Chicago Branch, Chairman; C. Van Derau, Dayton Branch and R. J. O'Connor, Bridgeport Branch.

Prize Award Committee on Papers

Dr. W. Blum, Chairman; W. S. Barrows, Toronto Branch; Willard Scott, Philadelphia Branch; Ben Hengst, Cleveland Branch, and Editor, F. C. Mesle, Rochester Branch.

The A. E. S. Research Committee has a very important task before it for this year, that of raising an ample research fund for a three-year period among manufacturers and others, as per resolution passed by the delegates at the Montreal Convention. Details will be published in the near future.

Yours very truly,
E. J. MUSICK,
Supreme President.

MONTHLY REVIEW

Published by the

American Electroplaters' Society

ONEIDA, NEW YORK

Editor's Office, 166 Willow Place, Sherrill, New York

VOL. XII SEPTEMBER, 1925 No. 9

EDITORIAL

1,200 MEMBERSHIP DRIVE

NOTICE, stay-at-home members, I want you to read this appeal:

We must increase our membership to at least 1,200 before December 1, 1925, in order to meet the increased expense budget for this year.

May I count on **YOU?** I mean **YOU,** to help us go over the top? Sure, I knew you would. Thanks. Now, I'll tell you what to do:

FIRST: Write down the names and addresses of every concern in your A. E. S. Branch district who maintains a plating department, whose foreman plater is not a member of the A. E. S. Also secure the foreman plater's name and home address, if possible, and make notation after names of those with whom you or other A. E. S. members are personally acquainted.

SECOND: Send this list to your branch secretary at once. Please do not delay. This is a membership drive and we can do this job in about 30 days' time, if we get into action and do it in a business-like manner.

THIRD: The branch secretary will then assign one or more members as a committee to call on each prospective member, and if he is eligible, the committee will explain to him the objects of our Society and answer satisfactorily any question or argument he may offer. Then hand him your fountain pen and have him sign on the dotted line.

FOURTH: Make a report to your branch secretary of

every prospective member called upon as promptly as possible.

FIFTH: Please don't forget that if a foreman plater is eligible there is absolutely no reason why he should not belong to the A. E. S. The annual dues of $6.00 is trival compared to the benefits to be derived.

SIXTH: Attend your branch meetings regularly. A large attendance means lots of discussion and A. E. S. spirit and the result is always knowledge and good fellowship.

Now, fellows, I want your earnest efforts for a couple of hours and please try and make your district 100% A. E. S. **MAY I COUNT ON YOU?**

E. J. MUSICK,
Supreme President.

THE PROTECTIVE VALUE OF NICKEL PLATING ON IRON AND STEEL

By C. T. Thomas and W. Blum

[1]Published by permission of the Director of the Bureau of Standards.

This paper includes the methods of study and the conclusions reached in an investigation of this subject at the Bureau of Standards. Further details will be published in an article to be presented at the September 1925 meeting of the American Electrochemical Society which will be published in Volume 48 of their Transactions.

I—General Principles

It has long been recognized that nickel plating does not exert the same kind of protection against the corrosion of iron and steel, as does zinc plating. The protective value of the zinc depends upon the fact that zinc has a greater "solution pressure" or tendency to dissolve, than does iron. When therefore zinc is in contact with iron, in the presence of moisture, an electrolytic cell is formed, in which the zinc is the anode, or dissolving electrode, and the iron is the cathode. The presence of zinc will therefore prevent iron from dissolving or corroding upon any small exposed areas.

Nickel, however, has a lower solution pressure than iron, and when nickel and iron are in contact in the presence of moisture, the corrosion of the iron is actually accelerated by the presence of the nickel. In view of these facts it is

obvious that in order to completely protect iron against corrosion by nickel plating, the later must be free from pores. The research therefore consisted principally in the determination of the conditions which led to the production of the most nearly impervious nickel deposits.

Among the possible causes of porosity in nickel coatings, are:

(a) The presence of defects in the base metal, such as blow-holes, or particles of slag, oxides, or sand from the molds. Plating does not usually cover such defects, and it may accentuate them. To eliminate such failures it is necessary to use proper care in the manufacture and selection of the steel.

(b) The presence of rust or other foreign materials on the surface. These may be removed by appropriate methods of cleaning and pickling.

(c) The presence of suspended matter in the plating solutions, which may lodge upon the cathodes. Such materials can usually be removed by filtration.

(d) The presence of gas bubbles on the surface, consisting either of hydrogen or of air, and the consequent formation of pits. The tendency for liberation of hydrogen and for pitting its partly determined by the acidity of the nickel bath, but is also undoubtedly influenced by other causes.

II—Methods of Plating

The experiments were made upon small pieces of cold rolled sheet steel, 4"x4" (10x10 cm). Six of these were plated at the same time upon a rack with approximately uniform current distribution. They were cleaned before plating by a great variety of processes and combinations, some of which will be referred to later. Pure (99%+) nickel anodes were used. Four different nickel solutions were applied under different operating conditions. At least twelve plates were made under each set of conditions.

III—Methods of Testing

A—Corrosion Tests

If the protective value of the nickel coatings is determined principally by their porosity, any conclusive test for porosity should indicate the relative protective value of the coatings. In making any porosity or corrosion test, it is

necessary to have the surface entirely free from grease. In buffing operations, the pores in the nickel may become filled with grease, and thereby the apparent protective value will be increased. In actual service, the presence of this grease may be an advantage, but in testing buffed coatings, it is necessary to clean the surface completely, for example in an electrolytic cleaner, in order to get reproducible results.

In this study the nickel plated samples were tested by four methods, and the average of the four results was taken as a measure of the relative protective value of the coatings produced under any given set of conditions. In order to average the results of different tests it was necessary to adopt arbitrary units, which were so chosen that the average of all the results by each method was about the same. The units used are defined under each of the following tests.

1—Ferricyanide Test (F). The solution was prepared as follows. About 1.3 oz./gal. (10 g/L) of agar-agar (a vegetable substance resembling gelatin) was dissolved in boiling water and 1.3 oz./gal (10 g/L) of sodium chloride and 0.13 oz./gal. (1 g/L) of potassium ferricyanide were added. On cooling, the solution set to a jelly, which became liquid upon being again warmed.

When the nickel plated sheets are dipped into this solution and allowed to drain, blue spots appear within a few minutes at any points where iron is exposed. For purposes of comparison the number of spots on each side of the plate within a circle 2″ (5 cm) in diameter was recorded. A small number of spots indicate a better coating than a large number. In order to obtain a rating which would correspond to the value of the nickel coating, 100 was divided by the average number of spots present on the two sides. Thus if within the circle, there were 19 spots on one side, and 15 spots on the other side, the average was 17 spots, and the ferricyanide rating was $\frac{100}{17} = 5.9$.

2—Salt Spray Test (SS). The samples were subjected to the spray of a twenty per cent solution of sodium chloride, by the method described in Circular 80 of the Bureau of Standards. Failure was judged by the appearance of

rust spots that could be readily seen at a distance of about 3 feet (1 meter). The results were expressed in terms of six hour periods. Thus if a specimen failed in 24 hours, it had a salt spray rating of 4.

3—Intermittent Immersion Test (I. I.). In this test the samples were attached to the spokes of a wheel, which rotated once in fifteen minutes. During one minute of each "cycle" the specimen was immersed in sodium chloride solution, (4 oz./gal or 30 g/L) and during the remaining 14 minutes it was in the air. Failure was defined by the same appearance as in the salt spray test, and was recorded in terms of the number of fifteen minutes cycles.

4—Atmospheric Exposure Test (A. E.) The samples were exposed to the atmosphere upon the roof of one of the Bureau of Standards buildings in Washington, until rust appeared which was plainly visible at a distance of about 3 feet (I meter). The results were expressed in "weeks" of continuous exposure.

B—Adhesion Tests

The adhesion of the nickel plating was measured roughly by observing whether the nickel peeled when the specimen was tested in an Erichsen penetration machine, in which a plunger is forced against the sheet till rupture occurs. The test was not very conclusive, as all specimens stood it except those in which the preparatory cleaning was known to be defective or in which a large amount of iron was present in the bath and the deposit.

C—Hardness Tests

The relative hardness, or more strictly the resistance to abrasion, was determined by scratch hardness tests. In this method a sapphire (or a diamond) point is drawn across the surface under a definite small load, and the width of the scratch is measured with a microscope. The hardest deposits yield the narrowest scratches.

IV—Results

It was found that the most important factor in determining the protective value of the coating is the thickness of the deposit. Thus it was found that the average rating of all the coatings which were 0.00025″ (0.006 mm) thick, was 1.4; of those which were 0.00005″ (0.013 mm) thick, it was 3.9; and of those that were 0.001″ (0.025 mm) it was

10.2. In other words, the protective value, as measured by the average of the four tests used, increased more than proportionally to the thickness of the deposit.

It was not found possible by any methods of preparation or plating to produce relatievly thin deposits of nickel (such as 0.00025" or 0.006 mm) which are nearly impervious or which furnish satisfactory protection against corrosion. The conditions of preparation which yielded results slightly above the average were (1) pumice scrubbing, (2) pickling with concentrated nitric acid, (3) anode pickling in concentrated sulphuric acid, (4) anode cleaning in alkali, and (5) a preliminary rinse in a very weak sodium carbonate solution just before plating. Even by these methods however the improvement was only slight, and in no way comparable to the effect produced by increasing the thickness of the deposit. Cathode electrolytic cleaning did not yield as good results as did the methods just referred to. Oxidizing agents such as hydrogen peroxide and potassium permanganate do not greatly decrease the porosity and they reduce the throwing power, especially at low current densities. Iron when present in appreciable amounts, especially as suspended sludge, increases the porosity of the deposits.

The use of copper, either prior to the nickel plating, or between an initial and final layer of nickel, was found to increase slightly the protective value, especially of the thicker coatings, such as those with a total thickness of about 0.001" (0.025 mm). The application of zinc or cadmium coatings prior to the nickel plating greatly increases the protective value, which however is not as good as if the zinc or cadmium were applied without any nickel upon it. Although the deposits with zinc or cadmium under the nickel do not readily show iron rust, they do become coated with white spots, and there is sometimes a tendency toward peeling of the nickel.

The hardness measurements showed that the hardest deposits are produced at a high current density, a low temperature, and with a high content of sodium sulphate in the bath. Warm solutions, especially those containing considerable chloride, usually produce softer deposits.

V—Conclusions

It is not practicable by any of the methods tried, to produce entirely impervious nickel deposits. No commercial deposits of nickel tested by this Bureau have been found to be entirely free from porosity. By increasing the total thickness of nickel or of nickel plus copper, to at least 0.001″ (0.025 mm) fairly satisfactory protection can be obtained. To produce this average thickness of nickel it requires about 20 ampere hours per square foot. Thus if the average current density is 10 amp./sq. ft., two hours will be required. The current density may be increased and the time of plating correspondingly shortened by using a high concentration of nickel salt, a relatively low pH, mod erate movement of the cathodes, freedom from suspended matter, relatively high temperature and pure nickel anodes.

The authors desire to express their appreciation for advice and assistance from their associates at the Bureau of Standards, especially T. P. Sager; and G. B. Hogaboom and the Research Committee of the American Electroplaters' Society.

PROCESS OF JEWELRY COLORING ON 10 AND 14-KARAT GOLD ON HIGH-CLASS AND CHEAP BRASS JEWELRY AND BRASS NOVELTY WORK

By E. L. Tannert, 2356 Waterbury Ave., New York City

The articles as they come from the jeweller's bench to be finished up presentable for sale are generally coated with a green film or scale which comes from the process of soldering or annealing.

This green scale is sometimes removed by the stripping process when articles require a highly polished finish and left on when finish calls for Rose Gold, Roman or any of the combination finishes, such as Green Gold, Rose Gold and all antique finishes.

Following I will give process of finishing articles in their respective finishes:

Bright Gold or Polished English Gold

The work is first strung up on copper wire of suitable gage to the operator. It is then put in a solution of lye or potash to remove all grease. Next, it is rinsed off well and

placed into a hot pickling acid consisting of 4 parts water and 2 parts sulphuric acid.

When making this pickling acid, always add water to jar first and acid last, and when adding acid pour in slowly.

Let work lay in this pickle for a period of about 15 minutes, then take out, rinse off well in clean, cold water. Next, pass through a potash or cleaning solution, rinse off again in cold water, pass through a stripping solution consisting of the following formula:

Stripping Solution Used for Taking Green Off Gold

Yellow Prucciate of Potassium...	6 ounces
Cyanide of Potassium	3 "
Liquid Phosphoric Acid	½ "
Water	1 gallon

Current strength from 6 to 9 volts, using a reversed current and sheet lead annode.

Liquid Phosphoric Acid may be added to this solution when it does not strip bright enough in small quantities, say, about 10 drops at a time.

Work should be given the full current at first and agitated very quickly in both until the desired brightness appears on work. It is then dried out and ready for the polishing bench or room.

When work has been polished and required a yellow English Gold finish, it is given a flash through a 24-Kt. fine gold solution, consisting of the following formula:

Gold Chloride	5 Dwt. fine gold
Cynide Potassium 98%....	3 ounces
Bisulphite of Soda 1/6	ounce
Water	1 gallon

24-karat fine gold anode to suit operator current strength from 6 to 9 volts. Solution used hot at about 176 Fahr.

This operation requires a good deal of experience and care on the part of the operator, for carelessness will mean that work will acquire a clouded effect and will have to be repolished again.

The work is generally given full current for about one second and agitated for about five seconds more, and quickly rinsed in perfectly clean water and dried out in

perfectly clean boxwood sawdust after being rinsed through perfectly clean hot water.

I may add that this same process of getting an English finish can be followed not only on the better class of jewelery, but on the cheap brass jawelry and novelties requiring a polished English yellow or red gold finish, where imersion of dip gold solutions are not in use.

I may also add that if a red or 14-Kt. shade is desired, to make a separate gold solution same as given for yellow, add 1½ dwt. of copper chloride to each gallon of solution.

The copper should be thoroughly taken up with Cyanide of Potassium, say, about 1 oz. of Cyanide to 1½ Dwt. of Copper, and then added to yellow gold. Use 14-kt gold anode. Current strength from 6 to 9 volts. Same rule for getting color as in yellow gold.

Bright Green Gold

Same process as in red gold. Make separate solution and add 1½ dwt. of fine silver chloride, taken in by same rule and added to yellow gold. Use green gold anode for this.

Cheap Brass Jewelry

On cheap brass jewelry the preliminary pickling is practically the same, only instead of stripping work with a current, you burn it off with what is called or termed a burning off dip, consisting of nitric acid 3 quarts and water 1 quart, with about ¼ lb. of common salt added. Work is left in this dip for about one minute, after which it is rinsed off thoroughly in clean, cold water and dried out and put in polishing room ready for polishing.

Sometimes it is advisable to pass work through a bright acid dip before drying. This is composed of the following:

Two quarts of nitric acid

Three quarts of sulphuric acid

with about 4 ounces of common salt added to dip. Dip should be mixed in order named and salt put into it only after acid has been thoroughly cooled off. After salt action cools off again dip is only ready for use.

Cheap Novelty Work

Now for the cheap novelty work finishes, such as dark green, light green, rose gold and all other antique colors are all done in this manner:

The bright finishes remain bright and are lacquered with a stiff white transparent lacquer and dried.

The antique greens and rose finishes and all other antique colors are filled in now with different colored pigments and cromes, such as may be desired, and can be acquired from most any of the leading lacquer concerns. In this manner you have only one operation in the plating room where production is wanted, and at the same time gives all your work a burnished effect on the high lights or relief work, not saying anything of the uniform color acquired on quantity lots and saving of gold.

First-Class Jewelry Antique Finishes

Now, the first-class jewelry antique finishes are got in an entirely different manner. The work is taken from the jeweler in the green state, as mentiond before, and polished where it is necessary to polish, and then sandblast for a dull matt finish and background for a rose gold or similar antique finishes.

It is then run through a cleaning solution such as are being sold on the market and rinsed thoroughly in clean water. Next, it is scratch brushed with a brass wire brush and again rinsed in clean, cold water, and then it is ready for the bath or coloring solution of what color is desired.

Rose Gold Solution

The rose gold solution for this kind of work I would recommend is as follows:

Cynide of Potassium 98%	6	oz.
Fine chloride of gold	5	dwt.
Potassium carbonate	1	oz.
Water	1	gallon

Fine 24-kt. gold anode to suit operator

Light Green Gold Solution

Cynide of Potassium 98%	6	oz.
Fine gold chloride.....	5	dwt.
Potassium carbonate	1	oz.
Fine silver chloride	1½	dwt.
Water distilled	1	gallon

Dark Green Gold

Same as above with an addition of either carbonate of lead or white arsenic powdered taken up with caustic of

potash. This must be done in a very careful manner, for an overdose of either lead or arsenic will completely ruin your solution.

I would advise operator to use an ordinary common eye dropper in adding darkness; in this manner there is less chance of spoiling or getting an overdose in the solution.

There is no need of any given amount of either darkness to be mixed up. Take a few ounces of ether in a bottle and put a little water, say, a pint to it, and add enough of caustic of potash to pick it up, and stir well and let settle. Only use clear liquid on the top. This is termed as smut by some platers.

As for using these solutions and getting required results, you use full voltage on your work at first to strike it and then keep agitating your work until desired color is obtained. Same rule can be followed for both solutions.

When desired color is obtained, remove from solution, rinse thoroughly in clear water, and relieve high light with bicarbonate of soda by rubbing and scratch brush with brass wire brush and soap back water wherever desired.

Rinse again in clean, cold water and again in clean, hot water and dry out in thoroughly clean boxwood sawdust.

There are quite a few different ways of obtaining selfsame finishes. There are ways which may be termed middle class as far as expense is concerned, with a first-class appearance.

These ways are generally used in shops where they want fairly good work and get fairly good prices for same.

ORMOLU GOLD FINISH ON SOFT METAL FIGURE WORK

E. L. Tannert, New York Branch

The work is first put through a potash or cleansing solution. It is then scratch brushed with a brass wire brush all over thoroughly to insure its cleanliness. It is then taken and put on hooks or racks or wire such as operator may desire.

Next it is passed through a potash or cleansing solution,

rinsed off thoroughly and placed into a solution of cyanide of copper, this solution consisting of the following formula:

Cyanide Potassium 98%	1 lb.
Carbonate of Copper	½ lb.
Carbonate of Soda	6 oz.
Bisulphite of Soda	½ oz.

It is plated in this solution as follows:

Full current strength of about 6 volts thrown on work for about 1 minute until work is thoroughly coated with a light film of copper, current is then reduced to about 2½ volts for about five minutes more, work is then taken out of tank and rinsed off thoroughly and placed into a sulphate of copper solution bath for a period of about 1½ hours at a voltage strength of 1½ volts.

This sulphate of copper bath should be of the following formula:

C. P. Sulphate copper crystals....	2 lbs.
C. P. Sulphuric Acid from.....	1 to 2 ozs.
Water	1 gallon

Sulphuric acid can be regulated to suit operator and class of work; for flat work would advise 1 oz. and for work that has any deep recess and hollows 2 ozs. or trifle more.

It is also advisable to use, say, I quart of glycerine to every 150 gallons of solution.

Work is taken out of acid copper bath when given time is up and rinsed off thoroughly in clean, cold water. It is now padded quickly through an acid dip consisting of:

2 gallons of nitric acid
3 gallons of sulphuric acid
6 ozs. of common table salt

Mix up in order named and allow to cool. Work must be rinsed off thoroughly after passing through this dip in clean, running water.

Next it is passed through a cyanide dip consisting of, say, ¼ lb. of cyanide per gallon and quickly rinsed off in clean, cold running water.

It is then passed through a dip consisting of 2½ ozs. of silver, 6 gallons of water and 1 lb. of cyanide of potassium

98% pure. Work must be passed through this dip quickly and rinsed off thoroughly after.

This dip puts on a sort of pink shade in color on work and takes the place of a brass solution which is generally used for a preliminary strike before going into gold solution on this type of work.

When work has been passed through this dip and thoroughly rinsed off, it is ready for the final flash in the gold solution, which consists of following formula:

Fine Gold Anode:

Fine gold	5	dwt.
Yellow prucciate of potassium...	12	ozs.
Phosphate of soda	6	ozs.
Carbonate of soda	1	oz.
Bi-sulphite of soda	½	oz.

Work is given full voltage of 6 volts for 1 second and agitated quickly for 5 more seconds. Rinse off quickly in clean, cold water, then in clean, hot water and put into clean boxwood sawdust to dry out thoroughly.

My reason for using the pink silver dip in preference to the brass solution is this:

While we all know that using brass solution is a saving in gold, my intention is this:

The casting may not be of the best quality, and in this case you have less danger of your work spitting out, for it is really the cyanide which plays a big factor in this trouble.

So you can readily see by taking work from acid copper bath and dipping it quickly and rinsing it well it is passed through a weak cyanide of silver dip for only, say, 10 seconds.

Whereas, by putting it in a brass solution it helps to fill up the porous holes with cyanide which the acid dip has opened up and causes spitting out after. You will note there is no cyanide used in gold solution, either, as regards difference in amount of gold consumed in this operation. When time saved and maintenance and upkeep of brass bath are summed up there is practically no difference in cost. Durability of finish is practically the same also, if not better in some respects, and salt water gold solution is not needed. Same gold solution can be used for other classes of work.

SPOTTING OUT

Written for the 13th Annual Convention of the American Platers' Society at Montreal, Canada

By Mr. R. M. Goodsell

Spotting out of deposits of metal from Cyanide Solutions is a very common occurrence and possibly always will be as long as plating is done in Cyanide Solutions. It is not the object of the writer to tell you that it can be stopped, but if the suggestions offered are carried out it can be eliminated to a great extent.

Spotting out is a brown spot that appears on deposits of Brass, Copper and Bronze at different periods of time after drying. Sometimes these spots appear immediately after plating and often appear as long as three or four months after the articles have been Buffed, Lacquered and Shipped to the customer.

Spotting out occurs more frequently on porous metals, such as Cast Iron, Cast Bronze and Steel that is known as Pickled Stock which has been electroplated in Cyanide Solutions, although it also occurs on Cold Rolled Steel, or any Metal that has a finer grain structure.

Spotting out usually appears on articles that are heavily plated, although beautiful specimens have been obtained on articles that have only a light deposit of metal.

The articles that will be passed out for examination were taken from a lot of goods that had been plated, put in stock for a month and then packed in cases, which were in perfect condition when they left the factory. This shipment was about two weeks in transit, exposed to various temperatures, and upon arrival were opened and found covered with brown spots and rust in the center of these spots. After the return of the shipment this matter was taken up with several parties that were considered experts on plating, with the result that we were more confused as to the cause than before. The writer as a last resort then wrote a letter to Dr. Watts of the University of Wisconsin, sending samples of work and the different methods of procedure; excerpt of Dr. Watt's letter which I quote, with the result that the difficulty has been overcome:

"The samples arrived O. K., and an examination con-

firms my previous opinion that some pieces of it are unfit to plate. On both the ball burnished samples I find a dozen or more deep cavities, the bottoms of which were not touched by the balls, while the edges of the deeper ones were "peaned' over to make the cavity bottle-shaped. The rough, unburnished bottom and sides of these pits hold tenaciously whatever solution touches them. The trouble in plating such metal is three fold:

"1st. Within the pit the plating is much thinner than outside, or may even not completely cover the underlying metal.

"2nd. Removal of the plating solution by rinsing is likely to be imperfect.

"3rd. The lacquering is likely to be imperfect in the pits because the lacquer is diluted by plating solution or rinse water.

"If you cannot reject all metal having these deep and narrow pits, the remedy is to improve conditions in each of the three respects noted above. Give a longer plate, rinse more thoroughly, and the last rinse in **clean** water, and if the lacquering is by dipping (I do not know how you apply water lacquer, but suppose it is by dipping?) repeat the dip enough times to insure that the lacquer reaches the bottom of the pits in its full concentration, not diluted by water left in the pits from rinsing.

"Salt would, as you suggest, cause corrosion, but I do not think it did so i nthis case, for you will note that corrosion was confined to the pits and close to them, as if some chemical had oozed out of the pits. As the articles were dry when shipped, corrosion would not start until moisture had condensed on them, or been absorbed from the air by chemicals retained in the pits. This would occur when the shipment was brought from the cold into a warm room.

"Ten seconds immersion in an electric cleaner, dilute and containing no caustic, only soda ash and trisodium phosphate, would be a great help in removing the plating solution after the articles are plated.. If you still have trouble after trying the other remedies, you had better try this. The hydrogen evolved in the pits helps to drive

out the solution held in them, but of course leaves the pits filled with the cleaning solution. Caustic is especially hard to rinse off of metal surfaces, so had better be left out of the cleaner if you have to use one for this purpose.

"Occasionally examine samples before and after plating with a strong magnifying glass (the smaller the diameter of the glass, the higher its power); this will give warning of lots of work that require special treatment."

One of the most important factors to prevent spotting out on Bright Brass Plating when Water Dip Lacquer is used, is the quality of lacquer used.

It is absolutely necessary that the lacquer has a precipitating medium that will throw all water and moisture out of cavities and deep recesses and at the same time seal up these cavities and recesses thus preventing any danger of moisture of any kind from getting to, or, coming out of the article plated. Hot Water opens the pores of the metal; Cold Lacquer seals them.

Summary

Keep plenty of free cyanide in solution.

Rinse work thoroughly and be sure that water is kept free from cyanide or soda.

When using Water Dip Lacquer, keep hot water free from impurities.

Be sure your lacquer is kept cold.

Work that is heavily plated dry thoroughly by aid of heat, if possible.

Do your share in our membership drive.

BRANCH NEWS

Cleveland Branch

I hope this report will reach you in time for the REVIEW. Our meeting was one week later this month, and have been very busy until now. September 12, 1925, the Cleveland Branch met at the Hotel Winton for their regular September business meeting. The meeting was called to order at 8:15 P. M. by President Scott. The attendance was large, with all officers present. Mr. J. B. Heargist, Chairman of our Research Committee, read a paper on Faraday Law, which was very interesting to all and was the discussion of the evening. Mr. William Shultz was elected to membership. Adjournment was called for at 10:30 P. M.

Cleveland Branch

On August 16, Cleveland Branch held its third annual picnic at Puritas Springs, Ohio, where 41 "Ohioans" and one "Jerseyite" (the one from New Jersey being Royal F. Clark, now located in Cleveland) enjoyed the day in many ways at the pleasure park, including an occasional cool drink from the ever-flowing stream of "Pure" H_2O, from which the park takes its name. Among the first to arrive was Henry Ter Doest and family from Akron. Distance does not prevent Henry from attending our meetings or picnics.

At 1 P. M. tables were spread under the large, shady trees in the picnic grove, where a bountiful repast was partaken by all.

At 2:30 P. M. the most important event took place on the baseball diamond, a ball game between the "Gold Platers" and "Nickel Platers." Ter Doest, captain of the "Gold Dust" team, had for his able assistants, Singler, Kneeland, Smith, McCormick, Lucas and one known as Emery, while Purcell chose Zodowski, Singler, Jr., Marker, Reem and two players known as Pumice and Fierman Lakewood. This game was played with seven players on each side, as it was found that inasmuch as the game was played so fast and furious (in spite of the sun boiling, the mercury up to 99° Fah.) the shortstop and center fielder could be dispensed with, as the umpire ??? condescended to stop the ball should it whiz past his ear. The first man at the bat was "Royal F.," who swatted the first ball pitched so hard that it nearly landed on the roof of the roller skating pavilion. Singler, Jr., chased the spherical leather, but Clark was on the home plate before it landed. Singler, Sr., Kneeland, Ter Doest and Smith came in for their share of home runs. Singler, Jr., had a creditable batting average for a youngster of 12 years. Henry made a grandstand slide when he was trying to steal second base. The worthy ??? umpire, ??? Mr. Hergeist, came in for considerable condemnation, due to his faulty analysis of a close play when Clark tried to steal second base. Clark insisted he was safe, and he was, but for some unaccountable reason unknown the sun's rays were deflected into the umpire's eyes, which prevented him from discerning the base, Clark and the ball in "Zad's" hand; yet the decision stood, despite the trend of opposition from the "grandstand," and Clark's desperate efforts to have him reconsider it. "Fireman Lakewood," pitcher for the "Nickel Plate" was good at the start, but as time went on the plate seemed to widen until a ball pitched two feet either side of the plate was a "strike." The spectators in the "grandstand" were very hilarious at times, especially when the umpire ??? (the three question marks after the umpire are used to denote the one "out" on Clark at second base and the two runs which the "Golde" team scored in the first inning, but the scorekeeper, Mr. Summerfield, failed to mark down, due to his inability to secure an Eversharp pencil at the beginning of the game). However, the score was 19 runs for the "Nickel Platers" and 15 for the "Gold Platers." The 15 was not credited until after a slight discrepancy was found by "Royal F." in checking up on Summerfield's score card. The "heat of the day" had much to do with the few errors, discrepancies and

home runs on the "Nickel" side. At 4:30 P. M. the game came to a close, after pitcher Kneeland resigning the pitcher's box for two innings to Clark, who, instead of throwing a "spit curved" ball used what is known in the plating fraternity as a "methyl curve," which in plain language means that the ball before being thrown is sprinkled with a very weak solution of Dimethylglyoxing.

Master Singler suggested that the Branch hold a picnic more often, so a petition will be circulated to get the consensus of opinion of the majority. After a few more sips of that good old Pure H_2O at the spring the picnickers wended their way homeward and the third picnic of Cleveland Branch became history.

A more elaborate report of the picnic (humorous and otherwise) will be read by the author, Royal F., at Cleveland's meeting, and it is urged that all members be present at the meeting to hear it read, even though it may not be appreciated as much as those who attended the picnic.

New York Branch

On August 8, about 40 members of the A. E. S. (20 from New York Branch and 20 from Newark Branch) spent the day visiting the refining plant of the Raritan Copper Works at Perth Amboy, N. J., through the courtesy of Dr. Skauronski, who acted as our guide, and I must say it was one of the most interesting trips I have ever made to an industrial plant, and all of the rest of the boys agreed with me. We spent about three hours in the plant seeing and having explained to us the electrolytic refining of metallic copper from the blister pigs as they come from the mine smelters, and the manufacture of the by-products, such as silver, gold, nickel, lead, arsenic, platinum, vanadium and copper and nickel sulphates. We went through two "tank houses" or plating rooms, covering several acres.

I have just received a letter from our Sheffield member, Mr. A. Bamker, commenting on conditions in England relative to the progress made in the deposition of chromium, in answer to a letter from myself on the same subject here in the U. S. A. The following is an excerpt from his letter: "Judging from what you say the deposition of chromium does not seem to have made much more progress with you than it has with us. A company that was formed in Sheffield, England for that purpose, with a capital of £30,000, ($125,000), has been in liquidation for the past six months, and no one seems very keen on taking it over. I have myself got some excellent results, but to get it on a sound, commercial basis is a very difficult matter; 100 to 175 amperes per square foot at a temperature of 113 degrees with lead anodes is not altogether like a picnic to Coney Island. The man who had it in hand here pretty well poisoned himself.

Read about the membership drive and then act.

Detroit Branch

The Detroit Branch held its regular meeting at the Detroit Engineering Society Clubrooms. Our President and Vice-President not being present, our "Stand-By," Station "E.G.L." broadcasted for the evening in his usual snappy manner. Discussion on the advisability of associate members to hold office with no definite recommendations.

Some of our members are dabbling with chromium baths, using Sargent's solution, but are far from being satisfied with their results commercially.

One member complained of "rainbow stains" on satin finish nickel. He uses a weak muriatic dip to eliminate them (after cold water rinse).

Possible causes: Basic state of solution and impure water.

Remedies: Reducing the PH of his nickel baths, heating work with electricity. Avoiding the use of gas for drying. Drying by the use of an electric fan. An addition of bi-carbonate of soda and sulphuric acid in a rinse; also by the addition of a prepared mixture called "The Great L" in a rinse, 1 to 4 ozs. to 1 gal. cold water.

Our old friend, General Pitts, bobbed up again. Here are some new causes: Particles of Tripoli which are lodged between sections rivited or spot welded together, the organic matter works out and attracts the hydrogen. Also the use of improperly mixed buffing compounds containing kerosene.

The use of permaganete of potash brought out the following: It stops pitting, oxidizing the iron, etc., precipitating the oxidized material to the bottom of the vats. One member had trouble with his nickel color buffing (white streaks) caused by having an excess of permaganate of potts.

Chicago Branch

Regular monthly meeting of Chicago Branch, A. E. S., held September 12, 1925.

Meeting called to order with President F. L. Greenwald presiding and all officers present and a very large attendance.

Subject for the evening was "Nickel Brightners" and proved very interesting.

Vice-President Jacob Hay read some data on this subject and promised a paper on same for the review in the near future.

Mr. Shepard of Detroit, Mich., was visiting with us and also spoke on his experience with nickel brightners.

Regular meeting St. Louis Branch, A. E. S., was called to order at 8 P. M. by President E. J. Musick. The Board of Managers reported favorable on the application of Joseph Zinselmeier, 8214 Minnesota avenue, St. Louis, Mo., and by a vote of the branch was elected to active membership. One new application was received from Robert Gibson, 2945 East 4th street, Los Angeles, Calif., for active membership. Under direction of the new librarian, Mr. Barthe, the President and Secretary, will assist him with the program for the coming year.

Indianapolis Branch

Indianapolis Branch held its regular meeting September 12, with a fair attendance. It was decided to revive the educational features at meetings, starting next meeting. Mr. George Barrows will start the ball rolling with a talk on conveyer work on stove castings. Each member present pledging himself to contribute something each meeting. We feel confident that we will have some pep in our meetings yet.

Boston Branch

Boston Branch met for the first time since last June, with President Talamona in the chair.

After the regular order of business one of the delegates to the convention made a report, which was very interesting, and will hear from the other delegate at the next meeting.

Boston Branch will hold a banquet for its members on October 3, 1925. A committee of two was appointed to make arrangements. Mr. Garrett and Mr. Lee were appointed.

A sample of gold plating on steel frames for mesh bags was shown by Mr. Simmonetti, and it was a very fine job. A discussion on it lasted for an hour.

The Branch will hold a talk on the copper solution at the next meeting.

Philadelphia Branch

After a two months' vacation the members of the Philadelphia Branch to the number of 27 met for the first fall meeting at the U. of P. on September 4. The meeting was called to order by our president and newly elected Supreme Vice-President, Mr. George Gehling. After the regular routine of business was transacted, Mr. Gehling read the report of the delegates to the Montreal Convention. Mr. Scott, one of our delegates, has compiled in pamphlet some data and hints gained from the addresses and talks given at the convention. Each Philadelphia member will receive a copy of this booklet.

The President appointed a committee to arrange for our annual banquet to be held on November 21, 1925.

Various subjects discussed at the convention were reviewed with much interest.

At the October meeting Mr. Graham will continue his talks on "Nickel Solutions" and "P. H. Indicators."

Put your shoulder to the wheel and help us over the top.

ELECTED TO MEMBERSHIP

Chicago Branch

Nikolas P. Di Cesare, Active .....427 Walker St., Michigan City, Ind.

St. Louis Branch

Jos. Zinselmeier, Active .....8214 Minnesota Ave., St. Louis, Mo.

Newark Branch

J. Donald Moulton, Active..Edison Storage Battery Co., West Orange, N.J.
Wm. J. Taylor, Associate .....11 Leo Place, Newark, N. J.

Detroit Branch

H. H. Yuerks, Active .....222 Fairmont St., River Rouge, Mich.
J. C. Robinson, Active .....203 Fischer Ave., Detroit, Mich.
N. J. Patterson, Active .....1550 Clairmont Ave., Detroit, Mich.

New York Branch

Geo. Simmons .....89 Gaylord St., Binghamton, N. Y.

APPLICATIONS FOR MEMBERSHIP

Rochester Branch

Carl Franklin Guy .....320 North Jefferson St., Syracuse, N. Y.
William H. Waer .....211 Helen St., Syracuse, N. Y.

St. Louis Branch

Robt. Gibson, Active .....2945 East 4th St., Los Angeles, Calif.

Cincinnati Branch

Charles Clingel .....1406 Vine St., Cincinnati, Ohio

Newark Branch

Geo. C. Bartow .....600 William St., Harrison, N. J.

New York Branch

L. C. Lodolee, Active .....497 Euclid Ave., Brooklyn, N. Y.
Frank Loeb, Active ..... 3007 Copper St., Brooklyn, N. Y.

Milwaukee Branch

Nickolaus Servantiuz, Active .....323 E. State St., Geneva, Ill.
Albert Gross, Active .....1360 American Ave., Milwaukee, Wis.

SUSPENDED

Detroit Branch

A. F. Norgen, O. H. Phelps, E. E. Farber, H. H. Cross, Fred Whipple, Sylvester Kuhry, John Paulo, A. Fitzgerald, L. J. Moore, Sidney Mount, E. A. Murphy, H. Moses.

1,200 or bust, says our Supreme President.

BOSTON

Regular meetings are held first Friday of each month, at 8 p. m., at the American House, Boston. Secretary, A. W. Garrett, 89 Alexander St., Dorchester, Mass.

BRIDGEPORT

Meets first and third Friday of each month at 62 Cannon St., Room 17, Bridgeport, Conn. Secretary R. J. O'Connor, 1128 Noble Ave., Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., Atlantic Hotel, 316 S. Clark St. Secretary, Robt. Meyers, 2210 Wilson Ave., Chicago, Ill.

CINCINNATI

Meets every Thursday, 7:30 p. m., at Vocational Training School, Spring and Liberty St. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, Ohio.

CLEVELAND

Meets first Saturday of each month at Hotel Winton. Secretary, H. S. Kneeland, 3924 Clybourne Ave., Cleveland, Ohio.

HARTFORD-CONN. VALLEY

Meets on the fourth Monday of each month at 747 Main St., Hartford, Conn. Secretary, Tennant Elwin, 1145 Boulevard, West Hartford, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Albert Bates, Box 34, Vandalia, Ohio.

DETROIT

Meets first Friday of each month at 478 Alexandrine West. Secretary, R. L. Shepard, 1388 Yorkshire Road, Fox Creek Sta., Detroit, Mich.

GRAND RAPIDS

Meets on the second Wednesday of each month at the Vocational High School, 129 Bostwick Ave., N. E. Secretary, John Raven, 1139 Emerald Ave., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

MILWAUKEE

Meets second and fourth Thursdays of each month at Lipps Hall, 321 3d St. Secretary, Roy Hunt, 4720 Lisbon Ave.

MONTREAL

Meets every Friday at 84 Craig St. West. Secretary, John H. Feelay, 411 Aylmer St., Quebec, Canada.

NEWARK

Meets first and third Fridays of each month at No. 17 Central Ave., Newark, N. J. at 8 p. m. Secretary, F. W. Matts, 55 Concord Ave., Hilton, N. J.

NEW YORK

Meets every second and fourth Fridays of each month in the World Building, Park Row, New York City, N. Y. Secretary, J. E. Sterling, 468 Grand Ave., Long Island City, N. Y.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Saturday of each month at 8 p. m., at United States Bureau of Mines Bldg., Forbes St. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 184 Washington St., Room 308, Providence, R. I. Secretary, Robert Crook, 185 County St., Attleboro, Mass.

READING

Meets on the second Tuesday of each month. Secretary, William M. Fisher, 654 Gordon St., Reading Pa.

ROCHESTER

Meets every second and fourth Saturday of each month at the Powers Hotel. C. A. Reama, Secretary, 512 Lyell Ave., Rochester, N. Y.

ST. LOUIS

Meets first Tuesday of each month at Barr Branch Library, corner Jefferson and Lafayete Sts. Secretary, F. P. Menniges, 3205 A Arsenal St., St. Louis.

TOLEDA

Meets first Thursday of each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. Secretary, W. W. Weiker, 411 3d St., Toledo, Ohio.

TORONTO

Meets fourth Monday of each month at Canadian Foresters' Hall, 22 College St., Room No. 2. Walter L. Barrows, 628 Dover Court Road, Toronto, Ontario, Canada.

WATERBURY

Meets every second and fourth Friday of each month. Secretary, Wm. F. Guilfoile, 230 Cooks St., Waterbury Conn.